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## (54) SKIRT FOR AN AIR CUSHION VEHICLE

(71) We, SEA-LOG CORPORATION, a corporation organised and existing under the laws of the state of Nevada, United States of America, of 3600 East Foothill Boulevard, Pasadena, California 91109, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to air cushion vehicles and, more particularly, to flexible skirts for such vehicles.

Vehicles which ride on a cushion of air are well known. A plenum chamber is formed beneath the vehicle in which air is maintained under pressure to form the air cushion, the chamber being formed by the bottom of the vehicle and a surrounding skirt projecting down from the bottom of the vehicle. Air is pumped into the plenum chamber to sufficient pressure to support the weight of the vehicle. Generally the skirt is designed to be sufficiently flexible that it can deflect on encountering obstructions, such as rocks or the like. At the same time, the skirt must be sufficiently rigid to maintain its shape in the presence of the internal pressure of the plenum chamber. Various skirt designs have heretofore been proposed which divide the skirt into independent sections to permit the skirt to ride over obstructions without substantial loss of air pressure, but such arrangements have required a corrugated design to provide sufficient stiffness to resist distortion from the internal pressure.

The present invention is a flexible skirt for an air cushion vehicle comprising a plurality of laminated layers of flexible material extending downwardly below the vehicle, and means securing the top edge portions of the layers to the vehicle, the layers being in sliding contact with each other, and each layer being divided by vertical slits into a plurality of separate flaps.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which: —

Fig. 1 is a perspective view of an air cushion vehicle incorporating the features of the present invention;

Fig. 2 is a partial front view of the vehicle showing one embodiment of the skirt;

Fig. 3 is a sectional view taken substantially on the line 3-3 of Fig. 2;

Fig. 4 is a partial front view of the vehicle showing an alternative embodiment of the skirt; and

Referring to the drawings in detail, the numeral 10 indicates generally a vehicle of the type which is designed to be supported on a cushion of air. Such a vehicle typically includes an engine-driven fan for drawing air in through a duct 12 and exhausting it under pressure into a plenum chamber 13 on the underside of the vehicle formed by a skirt, having side portions 14 and front and rear portions 16, 15, extending around the edge of the vehicle and projecting downwardly therefrom. The side portions 14 of the skirt may be formed by rigid extensions of the sides of the vehicle. However, the front and rear portions 16, 15 of the skirt are constructed, according to the present invention, so as to provide a flexible wall capable of deflecting and riding up over small obstructions encountered in the path of the vehicle.

As shown by the front view of Fig. 2, the front portion 16 of the skirt extends downwardly from the bottom 18 of the vehicle 10 between the side skirt portions 14. The front skirt portion 16 is constructed of a plurality of layers of flexible material, as shown in Fig. 3. The individual layers are held together adjacent their upper edge by



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channel member 20. The layers may be clamped, bonded or otherwise secured in the channel 20 and bolts or pins 22 may extend through channel member 20 and the upper edges of the layers of flexible material forming the skirt. Except where clamped together at the top edge, the individual layers are not secured to each other but are free to bend independently of each other.

In addition, the individual layers are divided horizontally by vertically extending slits 24 which divide the layers into a plurality of individual flaps. This permits each individual flap to deflect inwardly or outwardly in riding over an obstruction without deforming the rest of the skirt, thus reducing the amount of air leakage under the skirt in passing over an obstruction.

The flexible skirt material is preferably formed from layers of fiberglass material constructed with the glass fibers all extending vertically of the skirt. The glass fibers are impregnated or bonded by thermoplastic or a thermo-setting resin, such as butadiene, styrene, nylon, polyesters, polyurethanes, or the like, or thermo-setting resins, such as epoxy, ureaformaldehyde, acrylics or the like. Oriented fiber composites are well known structural materials, (see, for example, U.S. Patent Specification No. 3,686,048). In thin sheets, they exhibit the same properties as highly tempered spring steel, that is, they can bend to a high degree and still snap back to their original shape. By making the skirts of such material, laminated as shown, a very resilient strong yet flexible skirt is provided. Furthermore, to reduce abrasion, the flexible skirt layers are preferably coated with an elastomeric material, such as synthetic or natural rubber on the exposed surfaces. Where the layers overlap, they may be coated with a low-friction material, such as Teflon ("Teflon" is a Registered Trade Mark), to reduce wear between the overlapping layers. To further increase flexibility at the lower edges of the layers, they may be tapered in a vertical direction, with the lower edges substantially thinner than the top edges of the layers.

In the embodiment of Figs. 2 and 3, the layers of the front skirt are arranged so that the outermost layer is substantially narrower in vertical extent than the innermost layer, with the intermediate layers being graduated in vertical extent. Thus in passing over small obstructions only the innermost layer is deflected inwardly against the positive air pressure within the plenum chamber. As larger obstructions are encountered, additional layers may be deflected inwardly. This arrangement provides a skirt which is relatively flexible to forces exerted by obstructions that tend to bend the skirt inwardly toward the plenum chamber. At the same time, the outer layers provide additional stiffness to the outward deformation of the innermost layer by the positive pressure exerted by the air within the plenum chamber. The vertical slits 24 permit individual flaps of the skirt to be deflected by obstructions while adjacent flaps remain in their normal position on either side of the obstruction, thereby reducing deformation with attendant leakage of air beneath the skirt.

In the alternative embodiment of Fig. 4, the vertical slits 24′ of the respective layers are staggered to provide a shingle-like pattern of individual flaps. This arrangement permits the skirt to deform readily in response to contact with obstructions yet it prevents any leakage between the individual flaps as a result of any gaps forming at the vertical slits.

From the above description, it will be appreciated that a flexible skirt is provided which can be readily tailored to resist deformation by the positive pressure within the plenum chamber and at the same time yield and deform readily to accommodate objects of various sizes and shapes which pass beneath the skirt.

## WHAT WE CLAIM IS:—

1. A flexible skirt for an air cushion vehicle comprising a plurality of laminated layers of flexible material extending downwardly below the vehicle, and means securing the top edge portions of the layers to the vehicle, the layers being in sliding contact with each other, and each layer being divided by vertical slits into a plurality of separate flaps.

2. A skirt as claimed in claim 1, wherein the slits in the respective layers are offset laterally from the slits of adjacent layers.

3. A skirt as claimed in claim 1 or claim 2, wherein the layers project downwardly from the vehicle by successively greater amounts from the outboard to the inboard layers of the skirt.

4. A skirt as claimed in any preceding claim, wherein the individual layers are made of flexible plastics material reinforced with fiberglass material in which the fibers are all aligned vertically of the skirt.

5. A skirt as claimed in any preceding claim, wherein the exposed surfaces of each of the layers are coated with an

elastomeric material.

6. A flexible skirt for an air cushion vehicle substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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This drawing is a reproduction of the Original on a reduced scale.

Fig. 1

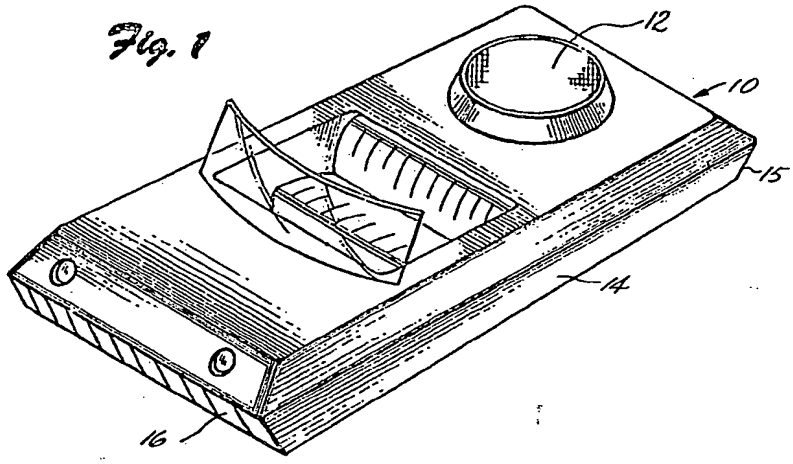


Fig. 2

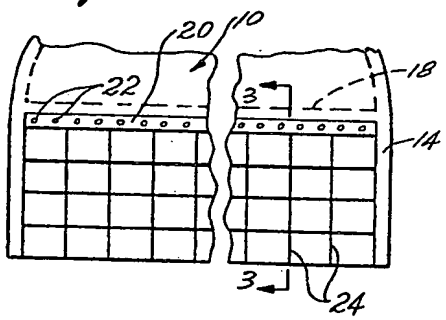


Fig. 3

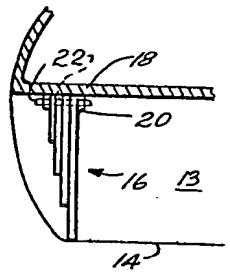


Fig. 4